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# Physics Division Update National Science Foundation

HEPAP Meeting  
September 6, 2013

Jean Cottam, Keith Dienes\*, Saul Gonzalez,  
Randy Ruchti, and Jim Whitmore  
Program Directors, Physics Division, NSF

\* At NSF until 8/23/2013

# Outline

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- Personnel Updates
- Budgets
- New Activities
- Comments on P5 Process



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703.292.8420

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703.292.8380

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703.292.8301

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703.292.8520

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Wendy Harrison, Division Director  
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703.292.8870

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703.292.8890

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703.292.8260

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Jeffery Lupis, Division Director  
703.292.8240

**DIVISION OF FINANCIAL MANAGEMENT (DFM)**  
Shir Raffin, Division Director / Deputy CFO  
703.292.8280

**DIVISION OF GRANTS & AGREEMENTS (DGA)**  
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703.292.8210

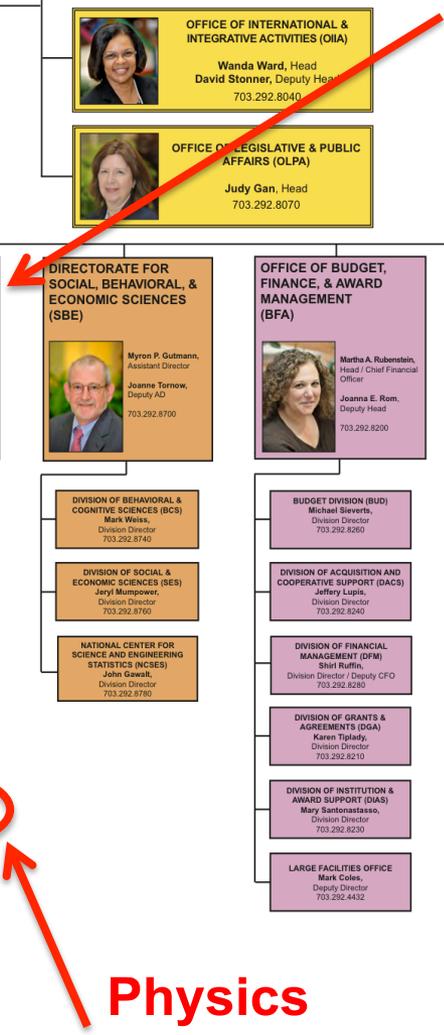
**DIVISION OF INSTITUTION & AWARD SUPPORT (DIAS)**  
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703.292.8230

**LARGE FACILITIES OFFICE**  
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**DIVISION OF INFORMATION SYSTEMS (DIS)**  
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Physics Division

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# Division of Physics

Denise Caldwell  
Director

Jim Whitmore  
Deputy Director (Acting)

Facilities

Large Hadron Collider  
Saul Gonzalez

IceCube  
Jim Whitmore

LIGO  
Mark Coles

NSCL  
Brad Keister  
Gail Dodge

Core  
HEP

HEP-  
related

Experiment

Atomic, Molecular, Optical, and Plasma  
Siu Au Lee  
Steve Gitomer

Elementary Particle Physics  
Saul Gonzalez  
Randy Ruchti

Particle Astrophysics  
Jean Cottam-Allen  
Jim Whitmore

Gravitational Physics  
Mark Coles  
Pedro Marronetti

Nuclear Physics  
Brad Keister  
Gail Dodge

Physics of Living Systems  
Krastan Blagoev

Accelerator Science  
Saul Gonzalez

Theory

Atomic, Molecular, and Optical  
Ann Orel

Elementary Particle Physics, Astrophysics, and Cosmology

Mathematical Physics  
Earle Lomon

Gravitational Physics  
Pedro Marronetti

Nuclear Physics and Nuclear Astrophysics  
Bogdan Mihalia

Physics of Living Systems  
Krastan Blagoev

Accelerator Science  
Saul Gonzalez

Cross-cutting

Physics Frontier Centers  
Jean Cottam-Allen

Education and Interdisciplinary Research  
Claudia Rankins

Physics at the Information Frontier  
Bogdan Mihalia, Ann Orel

Physics Instrumentation

# Personnel Changes

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- **Denise Caldwell** was appointed as Director of the Division of Physics in April 2013.
- **Jim Whitmore** is serving as Acting Deputy Division Director while a search is underway for a new Deputy Division Director.
- **Keith Dienes**, Program Director for HEP Theory and Theoretical Astrophysics/Cosmology, has reached the end of his four-year term as a “rotator.” After four years, NSF regulations require that all rotators separate from NSF for at least a year. Keith has therefore left NSF, effective two weeks ago.
- **Marc Sher** from the College of William and Mary will be replacing Keith at NSF for the next year.



# Budgets

# National Science Foundation Budget



(Dollars in Millions)

NSF by Account	FY 2012 Actual	Δ	FY 2013 Enacted	Δ	FY 2014 Request
BIO	\$712.28	-4.7%	\$678.93	12.0%	\$760.58
CISE	937.16	-8.4%	858.53	10.7%	950.25
ENG	824.55	-1.3%	813.54	12.0%	911.10
GEO	1,321.37	-4.2%	1,265.84	10.1%	1,393.86
<b>MPS</b>	<b>1,308.70</b>	<b>-4.5%</b>	<b>1,249.50</b>	<b>10.9%</b>	<b>1,386.12</b>
SBE	254.19	-4.6%	242.51	12.3%	272.35
IIA	398.60	8.7%	433.47	23.8%	536.62
US ARCTIC RESEARCH COMMISSION	1.45	-4.1%	1.39	0.4%	1.40
Research & Related Activities	\$5,758.30	-3.7%	\$5,543.71	12.1%	\$6,212.27
Education & Human Resources	\$830.54	0.3%	\$833.31	5.6%	\$880.29
Major Research Equipment & Facilities Construction	\$198.08	-1.0%	\$196.17	7.1%	\$210.12
Agency Operations & Award Management	\$299.30	-1.9%	\$293.60	3.6%	\$304.29
National Science Board	\$4.37	-5.7%	\$4.12	8.5%	\$4.47
Office of Inspector General	\$14.82	-11.0%	\$13.19	8.6%	\$14.32
<b>Total, NSF</b>	<b>\$7,105.41</b>	<b>-3.1%</b>	<b>\$6,884.10</b>	<b>10.8%</b>	<b>\$7,625.76</b>

Totals may not add due to rounding.

NSF FY 2013 Sequestration Guiding Principles: “We intend to make the necessary FY2013 reductions with as little disruption as possible to established commitments, and are using the following set of core principles to guide our sequestration planned activities:

- Protect commitments to NSF’s core mission and maintain existing awards
- Protect the NSF workforce; and
- Protect STEM human capital development programs.”

➔ **Reduced funds for new awards**

# MPS/PHY Budget



## Mathematical and Physical Sciences (MPS) Funding

(Dollars in Millions)

	FY 2012 Actual	$\Delta$	FY 2013 Enacted	$\Delta$	FY 2014 Request
Division of Astronomical Sciences (AST)	\$234.72	-0.9%	\$232.52	4.8%	\$243.64
Division of Chemistry (CHE)	234.03	-2.2%	228.97	10.8%	253.65
Division of Materials Research (DMR)	294.40	-1.2%	290.74	8.2%	314.63
Division of Mathematical Sciences (DMS)	237.72	-7.8%	219.19	11.6%	244.54
<b>Division of Physics (PHY)</b>	<b>277.44</b>	<b>-9.6%</b>	<b>250.72</b>	<b>15.3%</b>	<b>289.02</b>
Office of Multidisciplinary Activities (OMA)	30.37	-9.9%	27.36	48.5%	40.64
<b>Total, MPS</b>	<b>\$1,308.70</b>	<b>-4.5%</b>	<b>\$1,249.50</b>	<b>10.9%</b>	<b>\$1,386.12</b>

Totals may not add due to rounding.

Following the NSF Sequestration Guidelines that protect existing commitments including facilities

**3.1%** reduction to NSF

→ **4.5%** reduction to MPS

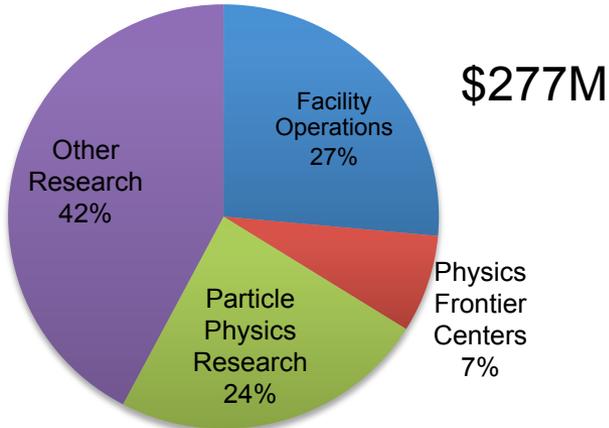
→ **9.6%** reduction to PHY

→ **Major impacts!**

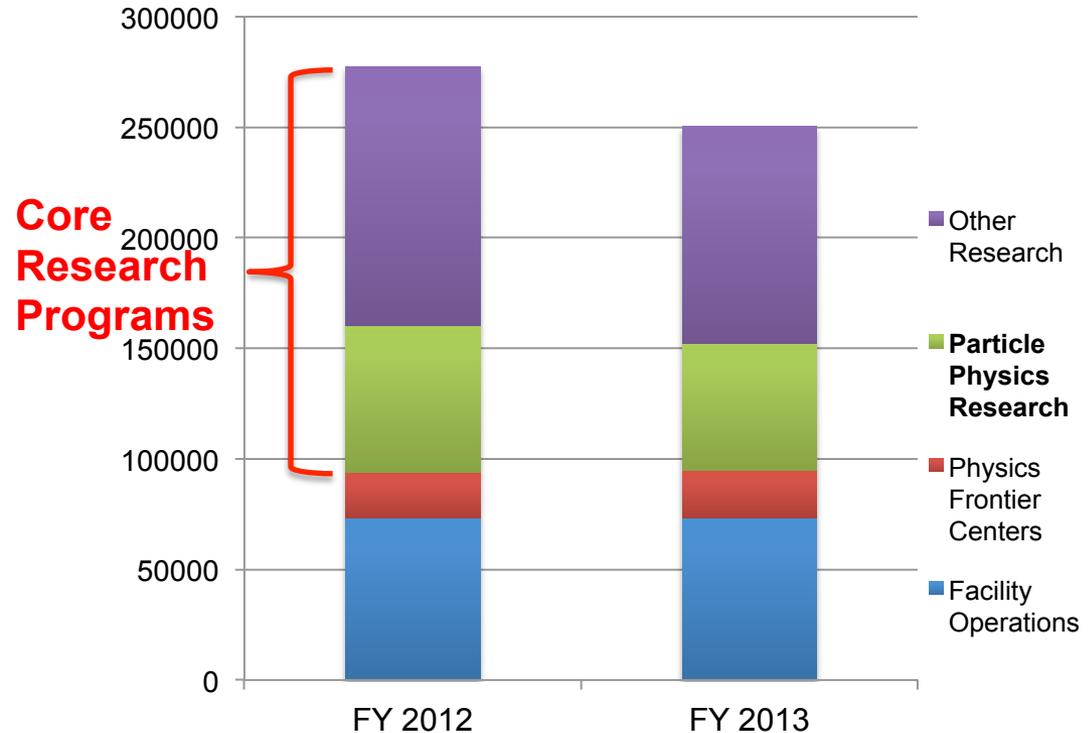
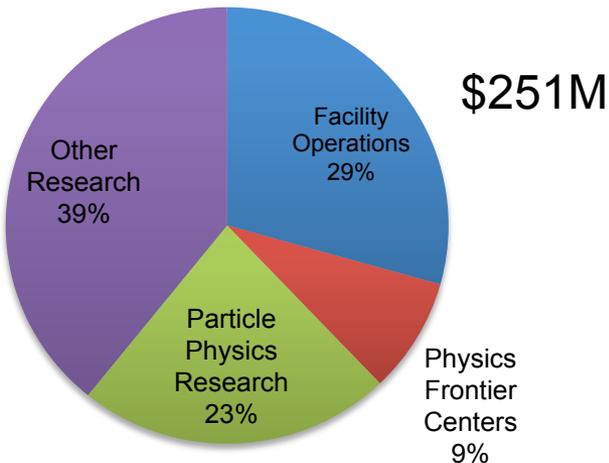
# FY2013 Budget Impacts



## FY 2012 (by activity)



## FY 2013 (by activity)



Approximately **12%** reduction in funds to research programs. Effective **36%** cut in funding for new awards

➔ Fewer awards, less support for faculty, postdoc, and students

# Particle Physics Funding Details



	FY 2008 Actuals	FY 2009 Omnibus	FY 2009 ARRA	FY 2010 Actuals	FY 2011 Actuals	FY 2012 Actuals	FY 2013 Estimates
<b>(in M\$)</b>							
<b>Experimental EPP</b>							
EPP Research	20.5	18.8	14.0	25.8	25.0	24.7	21.8
LHC Ops	18.0	18.0		18.0	18.0	18.0	18.0
CESR	13.7	8.5	1.3				
Accel/Instrumentation	4.0	2.2		3.0	4.1	11.9	4.5
<b>Experimental Particle Astro</b>							
Particle Astrophysics	15.8	15.9	15.3	17.9	9.7	11.5	12.0
IceCube Ops	1.5	2.2		2.2	3.5	3.5	3.5
DUSEL Planning	2.0	22.0		28.9	10.2		
Underground R&D	5.0	4.0	5.6	4.6	6.0	11.0	3.9
Underground Physics					8.4	6.3	6.8
<b>Theory</b> →							
THY (EPP/Astro/ Cosmo)	11.7	12.0	6.8	13.2	14.1	13.6	12.1
Physics Frontier Centers	6.3	5.9		5.9	6.0	6.0	6.0
<b>TOTAL Particle Physics</b>	<b>98.4</b>	<b>109.5</b>	<b>43.0</b>	<b>119.4</b>	<b>104.9</b>	<b>106.4</b>	<b>88.6</b>
<b>TOTAL Physics Division</b>	<b>285.0</b>	<b>275.5</b>	<b>102.1</b>	<b>307.8</b>	<b>280.3</b>	<b>277.4</b>	<b>250.7</b>
<b>% of Physics Division</b>	<b>34.5%</b>	<b>39.7%</b>	<b>42.1%</b>	<b>38.8%</b>	<b>37.4%</b>	<b>38.4%</b>	<b>35.3%</b>
<b>Allied Funding</b>	<b>7.2</b>	<b>4.9</b>	<b>0.5</b>	<b>12.7</b>	<b>12.3</b>	<b>24.7</b>	<b>20.8</b>
<b>Effective Total</b>	<b>105.5</b>	<b>114.4</b>	<b>43.5</b>	<b>132.1</b>	<b>117.2</b>	<b>131.1</b>	<b>109.4</b>

Allied Funding



## **New Activities in FY2014**

# New in FY 2014: Accelerator Science

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The acceleration and control of charged particle beams are essential tools for discovery science within the Physics Division: from high to low energy beams, high intensity sources for secondary or tertiary beams (e.g., neutrinos), nuclear physics, nuclear astrophysics.

- We are starting an accelerator science program with the goal of enabling fundamental discoveries and train students and postdocs across disciplinary boundaries
  - Program Description *PD 13-7243: “Accelerator Science”*
  - [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=504937](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504937)
  - Proposal target date: November 29, 2013
- Broader impacts are significant: industrial applications, medical applications, homeland security, light sources
- Program will focus on transformational developments that are likely to come from curiosity-driven research with strong interdisciplinary links
- Program will evolve with the community as new challenges are identified

# New in FY 2014: Dark Matter Solicitation



The current generation of direct dark matter experiments should all achieve their projected sensitivities and complete operations within the next few years. The more sensitive, "second generation" direct detection experiments, will then be required to either search with increased sensitivity or to measure in detail the detected dark matter.

- These next generation experiments will be selected through a solicitation for research and development and then construction beginning in FY 2014.
  - *Solicitation NSF 13-597: “Support for Construction of Direct Detection Dark Matter Experiments in Particle Astrophysics”*
  - [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=504939&org=PHY&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504939&org=PHY&from=home)
  - Letters of Intent due October 16, 2013
  - Full Proposals due November 26, 2013
- NSF and DOE will closely coordinate the selection and funding of the awards and subsequent support for the experiments.

# New in FY 2014: Mid-Scale Instrumentation



One of the most critical needs of research projects funded through the Physics Division is that of having cutting-edge instrumentation that enables investigators to remain competitive in a rapidly-changing scientific environment.

- The Physics Division has established a Mid-Scale Instrumentation Fund.
  - Dear Colleague Letter *NSF 13-118*: “Announcement of Instrumentation Fund to Provide Mid-Scale Instrumentation for FY2014 Awards in Physics Division”
  - [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf13118](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf13118)
- This is not a separate program to which investigators can apply directly. PIs should request funding for specialized equipment as part of a regular proposal to a disciplinary program in the Division. The Program Officer can then request funds be provided through the Mid-Scale Instrumentation Fund.
- Resources from the Mid-Scale Instrumentation Fund can be used for off-the-shelf purchases or for construction of specialized equipment.
- Mid-Scale Instrumentation Fund resources are non-renewable and are intended to be one-time investments in the research project.



## **FY 2014 Target Date/Deadlines**

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October 16, 2013	Letters of Intent for DDDM Solicitation
October 30, 2013	Experimental Elementary Particle Physics (EPP)
October 30, 2013	Particle Astrophysics
November 26, 2013	Full Proposals for DDDM Solicitation
November 29, 2013	Accelerator Science
December 5, 2013	Theoretical Elementary Particle Physics, Theoretical Particle Astrophysics and Cosmology



# Comments on P5 Process



# NSF/PHY Comments on P5

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- Focus on the Science in defining priorities:

*“To better understand this picture, we request an assessment of the current and future scientific opportunities over the next 20 year period.”*

- Describe the scientific return on investments:

*“Examine current, planned and proposed research capabilities and assess their role and potential for scientific advancement; assess their uniqueness and relative scientific impact in the international context and estimate the time and resources... needed to achieve their goals.”*

- Consider a balance of experiments. NSF/PHY will support small and mid-scale experiments, and well-defined university-led contributions to large projects:

*“We also request that HEPAP consider the appropriate balance of small, mid-scale, and large experiments and identify, where possible, multiple or complementary pathways to address the important scientific questions...”*

- Consider a range of projects that engage laboratory and university personnel:

*“... maintaining a healthy balance that preserves essential roles and contributions for national laboratories and universities and enables opportunities for global coordination of large initiatives.”*

- In constrained budget environments NSF/PHY must make programmatic decisions. We look to P5 report to recommend the highest priority experiments.